

WHAT IS CLAIMED IS:

1. A work machine management system for work machines that perform prescribed work by operation of a plurality of work machines, wherein

said plurality of work machines is connected by first communication means so as to make reciprocal communications possible;

one or a plurality of main work machines out of said plurality of work machines, and a server apparatus are connected by second communication means so as to make reciprocal communications possible;

each of said plurality of work machines is provided with work machine information detection means for detecting work machine information;

a database for storing data for managing said plurality of work machines, and management information production means for producing management information based on said work machine information and on data stored in said database, are provided at said server apparatus end;

in conjunction with work progress of said plurality of work machines, work machine information is detected by said work machine information detection means provided in said plurality of work machines, and the work machine information so detected is transmitted to said main work machine or machines through said first communication means;

said main work machine or machines transmit said transmitted work machine information to said server apparatus through said second communication means;

said server apparatus produces management information based on said transmitted work machine information and on data stored in said database, and transmits the management information so produced to said

main work machine or machines through said second communication means; and

    said main work machine or machines manage said plurality of work machines based on said transmitted management information.

2.     The work machine management system according to claim 1, wherein management information transmitted from said server apparatus to said main work machine or machines is displayed on a display device provided in said main work machine or machines.
3.     The work machine management system according to claim 1, wherein said prescribed work consists of a plurality of work processes; and said main work machine is determined for each of those work processes.
4.     The work machine management system according to claim 1, wherein management information produced by said server apparatus and transmitted to said main work machine or machines is information relating to maintenance that should be performed on any of said plurality of work machines.
5.     The work machine management system according to claim 1, wherein management information produced by said server apparatus and transmitted to said main work machine or machines is information relating to a trouble that has occurred in any of said plurality of work machines.

6. A work machine management system for work machines that perform prescribed work by operation of a plurality of work machines in accordance with a scheduled work plan, wherein

said plurality of work machines is connected by first communication means so as to make reciprocal communications possible; one or a plurality of main work machines out of said plurality of work machines, and a server apparatus are connected by second communication means so as to make reciprocal communications possible;

each of said plurality of work machines is provided with work machine information detection means for detecting work machine information;

a database for storing data for managing said plurality of work machines, and scheduled work plan production means for producing a scheduled work plan based on said work machine information and on data stored in said database, are provided at said server apparatus end;

in conjunction with work progress of said plurality of work machines, work machine information is detected by said work machine information detection means provided in said plurality of work machines, and the work machine information so detected is transmitted to said main work machine or machines through said first communication means;

said main work machine or machines transmit said transmitted work machine information to said server apparatus through said second communication means;

said server apparatus produces a scheduled work plan, based on said transmitted work machine information and on data stored in said database, and transmits that scheduled work plan so produced to said main work machine or machines through said second communication means; and

said main work machine or machines manage said plurality of work machines based on said transmitted scheduled work plan.

7. The work machine management system according to claim 6, wherein scheduled work plan transmitted from said server apparatus to said main work machine or machines is displayed on a display device provided in said main work machine or machines.

8. The work machine management system according to claim 6, wherein said scheduled work plan comprises a plurality of work processes; and said main work machine is determined for each of those work processes.

9. The work machine management system according to claim 6, wherein said server apparatus transmits information relating to maintenance that should be done to any of said plurality of work machines, and a scheduled work plan produced by revising current scheduled work plan in conjunction with the performance of maintenance, to said main work machine or machines.

10. The work machine management system according to claim 6, wherein

a terminal apparatus provided on the end where maintenance is done on said plurality of work machines is also connected to said second communication means;

said server apparatus transmits information relating to maintenance that should be done to any of said plurality of work machines, and a revised scheduled work plan produced by revising current scheduled

work plan in conjunction with the performance of maintenance, to said main work machine or machines; and

    said main work machine or machines transmit instructions for performing maintenance, based on the transmitted information relating to maintenance, to said maintenance terminal apparatus through said second communication means, and manage said plurality of work machines based on said revised scheduled work plan.

11. The work machine management system according to claim 6, wherein said server apparatus transmits information relating to troubles that have arisen in said plurality of work machines, and a revised scheduled work plan produced by revising current scheduled work plan in conjunction with occurrence of troubles, to said main work machine or machines.

12. The work machine management system according to claim 6, wherein

    a trouble correction terminal apparatus provided on the end where troubles with said plurality of work machines are corrected is also connected to said second communication means;

    said server apparatus transmits information relating to troubles that have occurred in said plurality of work machines, and a revised scheduled work plan produced by revising current scheduled work plan in conjunction with the trouble occurrence, to said main work machine or machines; and

    said main work machine or machines transmit instructions for correcting troubles, based on information relating to troubles that was transmitted, to said trouble correction terminal apparatus through said

second communication means, and manage said plurality of work machines in accordance with said revised scheduled work plan.

13. The work machine management system according to claim 6, wherein said server apparatus stores in memory schedule and performance results data indicating relationship between a scheduled work plan produced in past and actual work performance results as performed on basis of said scheduled work plan, and produces a new scheduled work plan based on said schedule and performance results data.

14. A scheduled work plan production apparatus that, in cases where a scheduled work plan is produced according to work request data indicating particulars of work requested by an ordering party, and work is caused to be done, using a plurality of work machines, based on said produced scheduled work plan, produces said scheduled work plan, wherein

a database for storing schedule and performance results data indicating relationship between said scheduled work plan produced in past and actual work performance results as performed on basis of said scheduled work plan is provided at said server apparatus end;

a terminal apparatus on said ordering party end, said server apparatus, and said plurality of work machines are connected by communication means so as to make reciprocal communications possible;

said work request data are input from said terminal apparatus on said ordering party end;

said server apparatus produces a scheduled work plan based on input work request data and on schedule and performance results data stored in said database, transmits said produced scheduled work plan to

said plurality of work machines through said communication means, and updates said schedule and performance results data in said database;

    said plurality of work machines performs work based on transmitted scheduled work plan and transmits actual work performance results as performed on basis of said scheduled work plan to said server apparatus through said communication means; and

    said server apparatus updates said database with said actual work performance results transmitted.

15. The scheduled work plan production apparatus according to claim 14, wherein

    when revision data for revising a current scheduled work plan are given, said server apparatus revises current scheduled work plan based on those revision data, said work request data, and schedule and performance results data stored in said database, and transmits said revised scheduled work plan to said plurality of work machines through said communication means; and

    said plurality of work machines performs work based on transmitted scheduled work plan, and transmits actual work performance results as performed on basis of said scheduled work plan to said server apparatus by said communication means.

16. A scheduled work plan production apparatus that, in cases where a scheduled work plan is produced according to work request data indicating particulars of work requested by an ordering party, a plurality of work machines is obtained, and work is caused to be done using said plurality of work machines so obtained, based on said produced scheduled work plan, produces said scheduled work plan, wherein

a database for storing schedule and performance results data indicating relationship between scheduled work plan produced in past and actual work performance results as performed on basis of said scheduled work plan is provided at a server apparatus end;

a rental/production end terminal apparatus for renting or producing said work machines is also provided;

a terminal apparatus on said ordering party end, said server apparatus, said plurality of work machines, and said rental/production end terminal apparatus are connected by communication means so as to make reciprocal communications possible;

said work request data are input from said terminal apparatus on said ordering party end;

said server apparatus produces a scheduled work plan based on input work request data and on schedule and performance results data stored in said database, transmits said produced scheduled work plan to said plurality of work machines and to said rental/production end terminal apparatus through said communication means, and updates schedule and performance results data in said database;

said plurality of work machines performs work based on transmitted scheduled work plan and transmits actual work performance results as performed on basis of said scheduled work plan to said server apparatus by said communication means;

said server apparatus updates said database with actual work performance results transmitted; and

said rental/production end terminal apparatus plans rental or production based on transmitted scheduled work plan.

17. The work machine management system according to claim 1, wherein

an information display for displaying information toward outside of work site where said plurality of work machines is operating is provided in one or more of said plurality of work machines;

said server apparatus produces information relating to said work site, based on work machine information transmitted and on data stored in said database, and transmits said information relating to said work site so produced to said main work machine through said second communication means; and

said main work machine displays said information relating to said work site so transmitted on said information display.

18. The work machine management system according to claim 17, wherein

said information display is deployed on a work machine other than said main work machine; and

said main work machine transmits transmitted information relating to said work site to another work machine through said first communication means and causes said information to be displayed on said information display deployed on said other work machine.

19. The work machine management system according to claim 1, wherein

an information display for displaying information toward outside of work site where said plurality of work machines is operating is installed in the periphery of said work site;

said server apparatus produces information relating to said work site, based on work machine information that has been transmitted and on data stored in said database, and transmits said information relating to

said work site so produced to said main work machine through said second communication means; and

    said main work machine displays said information relating to said work site so transmitted on said information display.

20. The work machine management system according to claim 19, wherein said main work machine causes transmitted information relating to said work site to be displayed on said information display installed in the periphery of said work site via said first communication means.

21. The work machine management system according to claim 1, wherein

    an information display for displaying information toward outside of work site where said plurality of work machines is operating is installed in the periphery of said work site; and

    said server apparatus produces information relating to said work site, based on work machine information that has been transmitted and on data stored in said database, transmits said information relating to said work site so produced to said information display through said second communication means, and causes said information relating to said work site so transmitted to be displayed on said information display.

22. A work machine management system of work machines that perform prescribed work by operation of a plurality of work machines inside a work site, comprising:

    environmental condition measurement means for measuring environmental conditions in the periphery of a work site, provided in the periphery of said work site;

an information display or displays for displaying information toward outside of a work site, installed in the periphery of said work site, or, alternatively, provided in one or more of said plurality of work machines;

communication means for connecting said environmental condition measurement means with a server apparatus and connecting said server apparatus with said information display or displays, so as to make reciprocal communication possible; and

display information production means, provided at said server apparatus end, for producing environmental condition display information based on measured environmental condition values and on data stored in a database; wherein

measured environmental condition values measured by said environmental condition measurement means, in conjunction with work progress of said plurality of work machines, are transmitted to said server apparatus through said communication means; and

said server apparatus produces environmental condition display information, based on measured environmental condition values so transmitted and on data stored in said database, transmits said environmental condition display information so produced to said information display through said communication means, and causes said environmental condition display information so transmitted to be displayed on said information display.

23. The work machine management system according to claim 1, wherein data on performance results for work performed by said plurality of work machines are stored in said database in said server apparatus for each of said plurality of work machines, and when data requesting production of a work report relating to a specific work machine are

transmitted from said main work machine to said server apparatus through said second communication means, said server apparatus reads out work performance results data corresponding to said specific work machine from data recorded in said database, produces a work report indicating particulars of work performed in a certain time period by said specific work machine, and transmits said work report so produced to said main work machine by said second communication means, and said main work machine manages said plurality of work machines based on said work report so transmitted.

24. The work machine management system according to claim 23, wherein

a terminal apparatus for labor management provided on the end where labor management is performed for persons on board said plurality of construction machines and said main work machine are connected by communication means to make reciprocal communications possible;

said main work machine transmits said work report to said terminal apparatus for labor management by said communication means; and

said terminal apparatus for labor management performs labor management for those on board said plurality of construction machines based on said work report so transmitted.

25. The work machine management system according to claim 1, wherein

said work machine information is work condition information indicating actual work conditions of a work machine;

data on schedule of work to be performed by said plurality of work machines are stored in a database in said server apparatus, for each of said plurality of work machines;

when said work condition information is transmitted from said main work machine to said server apparatus through said second communication means, said server apparatus reads out work schedule data from data stored in said database, compares those work schedule data and transmitted work condition information, and, when there is a discrepancy, produces anomaly information indicating that an anomaly has occurred in corresponding work machine, and transmits said anomaly information so produced to said main work machine through said second communication means; and

said main work machine manages said plurality of work machines based on said transmitted anomaly information.

26. The work machine management system according to claim 1, wherein

said work machine information is position information indicating actual position of a work machine;

operating positions at which said plurality of work machines operates are stored in a database in said server apparatus;

when said position information is transmitted from said main work machine to said server apparatus through said second communication means, said server apparatus reads out operating position data from data stored in said database, compares those operating position data and transmitted position information, and, when an actual position deviates from an operating position, produces anomaly information indicating that an anomaly has occurred in corresponding work machine, and transmits said anomaly information so produced to said main work machine by said second communication means; and

said main work machine manages said plurality of work machines based on said transmitted anomaly information.

27. The work machine management system according to claim 1, wherein

    said work machine information is attitude information indicating actual attitude of a work machine;

    attitude limit values for said plurality of work machines are stored in a database in said server apparatus;

    when said attitude information is transmitted from said main work machine to said server apparatus through said second communication means, said server apparatus reads out attitude limit value data from data stored in said database, compares those attitude limit value data and transmitted attitude information, and, when an actual attitude exceeds an attitude limit value, produces anomaly information indicating that an anomaly has occurred in corresponding work machine, and transmits said anomaly information so produced to said main work machine through said second communication means; and

    said main work machine manages said plurality of work machines based on said transmitted anomaly information.

28. The work machine management system according to any one of claims 25 - 27, wherein

    an anomaly handling terminal apparatus provided on the end where anomaly handling is performed for a construction machine wherein an anomaly has occurred, and said server apparatus are connected by communication means to make reciprocal communications possible;

    said server apparatus, when anomaly information has been produced by said server apparatus, transmits said anomaly information to said anomaly handling terminal apparatus through said communication means; and

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    said anomaly handling terminal apparatus performs anomaly handling for said construction machine at which said anomaly occurred, based on said transmitted anomaly information.

29. The work machine management system according to any one of claims 25 - 27, wherein

    an anomaly handling terminal apparatus provided on the end where anomaly handling is performed for a construction machine at which an anomaly has occurred, and said main work machine are connected by communication means to make reciprocal communications possible;

    said main work machine transmits said anomaly information to said anomaly handling terminal apparatus through said communication means; and

    said anomaly handling terminal apparatus performs anomaly handling for said construction machine at which said anomaly occurred, based on said transmitted anomaly information.

30. A management system for work machines that perform prescribed work by operation of a plurality of work machines, wherein

    said plurality of work machines is connected by first communication means so as to make reciprocal communications possible;

    one or a plurality of main working machines out of said plurality of work machines are connected to a server apparatus by second communication means so as to make reciprocal communications possible;

    work machine information detection means for detecting work machine information are provided in each of said plurality of work machines;

    a database for storing data for managing said plurality of work machines, and management information production means for producing

management information based on said work machine information and on data stored in said database, are provided at said server apparatus end;

in conjunction with work progress of said plurality of work machines, work machine information is detected by said work machine information detection means provided in said plurality of work machines, and said work machine information so detected is transmitted to said main work machine or machines through said first communication means;

said main work machine or machines transmit said transmitted work machine information to said server apparatus through said second communication means;

said server apparatus produces management information based on said transmitted work machine information and on data stored in said database, and transmits management information so produced to said main work machine or machines through said second communication means;

said main work machine or machines manage said plurality of work machines based on said transmitted management information;

judgment means are provided in said main work machine for judging whether communications are possible or impossible by said second communication means between said main work machine and said server apparatus; and

when it is judged by said judgment means that communications by said second communication means are impossible, latest management information received by said main work machine via said second communication means and latest work machine information received by said main work machine via said first communication means are stored in memory by said main work machine until it is judged by said judgment means that communications by said second communication means have become possible.

31. A work machine management system for work machines that perform prescribed work by operation of a plurality of work machines, wherein

said plurality of work machines is connected by first communication means so as to make reciprocal communications possible;

one or a plurality of main working machines out of said plurality of work machines are connected to said management system by second communication means so as to make reciprocal communications possible;

work machine information detection means for detecting work machine information are provided in each of said plurality of work machines;

a database for storing managing data is provided at said management system end for managing said plurality of work machines, and management information production software for producing management information based on said managing data and said work machine information;

said management system, when said main work machine is determined, transmits managing data stored in said database and said management information production software to said main work machine through said second communication means;

in conjunction with work progress of said plurality of work machines, work machine information is detected by said work machine information detection means provided in said plurality of work machines, and said work machine information so detected is transmitted to said main work machine through said first communication means;

said main work machine produces management information, based on work machine information transmitted from said plurality of work machines through said first communication means, and on managing data

and management information production software transmitted from said management system through said second communication means, manages said plurality of work machines, based on said management information so produced, updates said managing data, and transmits said managing data so updated to said management system, by said second communication means, every time a certain time period elapses; and

    said management system updates content stored in said database using those transmitted managing data.

32. A work machine management system for work machines that perform prescribed work by operation of a plurality of work machines, wherein

    said plurality of work machines is connected by first communication means so as to make reciprocal communications possible;

    one or a plurality of main working machines out of said plurality of work machines are connected to the management system by second communication means so as to make reciprocal communications possible;

    work machine information detection means for detecting work machine information are provided in each of said plurality of work machines;

    a database for storing managing data for managing said plurality of work machines, and management information production software for producing management information based on said managing data and said work machine information, is provided at said management system end;

    when said main work machine is determined, managing data stored in said database and said management information production software are written to said main work machine;

    in conjunction with work progress of said plurality of work machines, work machine information is detected by said work machine

information detection means provided in said plurality of work machines, and said work machine information so detected is transmitted to said main work machine through said first communication means;

    said main work machine produces management information, based on work machine information transmitted from said plurality of work machines by said first communication means, and on said managing data and management information production software that were written, manages said plurality of work machines, based on said management information so produced, and updates said managing data; and

    content stored in database in said management system is updated by writing said updated managing data to said management system.